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APPENDIX I (of two)

to accompany

SPECIAL FLOOD CONTROL REPORT

Los Angeles, San Gabriel, Santa Ana Rivers, California

FLOOD CONTROL
FIELD COORDINATING COMMITTEES 18-20
March 29, 1938

E. I. Kotok, Director
California Forest and Range
Experiment Station
Co-Chairman

Harry E. Reddick, Regional Conservator
Soil Conservation Service
Co-Chairman

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Second Typing

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IN CONNECTION

RECEIVED 1 10 1941

FOR INSPECTION, AND CONTROL, SANTA ANA RIVER, CALIFORNIA

FROM LOS ANGELES
FIELD COORDINATING STATION 12-30
March 22, 1941

Henry L. Hobbins, Regional Commissioner
Cell Construction Section
San Francisco

W. I. Hobbins, Director
California Forest and Range
Experiment Station
Berkeley

Second Typing

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WATERSHED CONDITIONS

WATERMERE CONDITIONS

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WATERSHED CONDITIONS

PLATE 1



3-14-38

S.C.S. HMG-1

- A. Dense shrub cover afforded maximum protection to watershed slopes, although intensity and duration of the 1938 storm caused heavy runoff that scoured many years' accumulation of debris from the canyon bottoms. Santa Ana watershed, east of San Bernardino.



3-14-38

S.C.S. HMG-2

- B. Barred soils, severe erosion, and rapid runoff cause floods below fire-damaged watersheds. This area has yielded debris during each storm since its denudation in 1935; it was stable before the fire. Frankish Canyon, Santa Ana watershed, San Bernardino N. F.

WATERSHED CONDITIONS

PLATE 2



3-21-38

U.S.F.S. DMI-883

- A. Slow recovery of vegetation twenty years after fire, in Big Tujunga drainage, Los Angeles watershed. This condition aggravates flood and erosion problems.



3-21-38

U.S.F.S. DMI-884

- B. Vegetation of well-forested watersheds gives maximum protection against erosion. West fork, San Gabriel drainage, Mt. Wilson on center skyline.

1911

U.S. Forest Service
Department of Agriculture
Washington, D.C.
1911

U.S. Forest Service
Department of Agriculture
Washington, D.C.
1911

1911

U.S. Forest Service

U.S. Forest Service
Department of Agriculture
Washington, D.C.
1911

WATERSHED CONDITIONS

PLATE 3



1935

U.S.F.S. 312371

- A. Under normal conditions of watershed cover, these buildings in Frankish Wash were safe for many years. Even peak runoff of 1933-34 New Year's storm passed safely through drain under sheds.



3-11-38

U.S.F.S. CHG-1426

- B. Delivery of debris started with first storm following denudation of the watershed by fire in 1935, and is still continuing. Buildings shown above were destroyed and \$50,000 of damage was done to homes, citrus groves, and streets the first winter alone. Frankish Canyon, Santa Ana watershed.

WATERSHED CONDITIONS

PLATE 4



2-28-34

U.S.F.S. 291243

- A. Denuded by fire, these 1/50-acre plots in 3-inch storm of February, 1934, eroded at rate of 19,000 cu. yds. per square mile (direct conversion). Haines Experimental Area, Pickens burn, Los Angeles watershed.



3-13-38

U.S.F.S. CHG-1047

- B. Densely covered with vegetation four years later, the same plots yielded not a particle of soil, showing stabilizing effect of plant cover, under 15-inch heavy intensity rainfall of March 1938.

2-22-38
A. Planted by fire, these 1/20-acre plots in 3-inch stems of Western
1938, crossed at rate of 10,000 cu. yds. per acre with (direct
conversion). Kansas Experimental Area, Kansas State
University.

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"PHOTO BY Clark H. Glasgow"

COURTESY

FOREST & RANGE EXPERIMENT STATION

U. S. FOREST SERVICE

1-17-38
B. Planted with vegetation four years later, the same plots
yielded not a particle of soil, showing stabilizing effect of
plant cover, under 12-inch heavy intensity rainfall of March
1938.

WATERSHED CONDITIONS

PLATE 5



3-16-38

U.S.F.S. WTC-26A

- A. Slumping and land-slips occurred widespread along the mountain front above Altadena. Attributed primarily to excessive steepness of the slopes, it was greatly augmented by trails and firebreaks. Big Santa Anita Canyon, San Gabriel watershed.



3-13-38

U.S.F.S. CHO-1443

- B. Slumps and slides were larger and more serious in fire-denuded areas of like topography. Pickens burn of 1933, Los Angeles watershed.

USF3-WFO 26A

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U.S. E.A. WFO-26A

3-16-33
A. Shading and land-type indicated along the mountain
front above Alhambra. Alhambra is indicated by a
of the slope, it was greatly augmented by trails and firebreaks.
The slope with contour, see detailed watershed.

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3-16-33
B. Shading and land-type were further and more serious in five-gummed
area of the topography. (Sketches from 1933, Los Angeles water-
shed.)

FLOOD CONTROL MEASURES

FLOOD CONTROL MEASURES



3-8-38

U.S.F.S. CHG-1401

Flood control dam built in 1928 estimated two-thirds filled with debris by 1938 flood. Storage capacity 76,500 cu. yds., drainage area 2.39 sq. mi. Watershed is exceedingly rugged, probably not burned since 1900. Sierra Madre Dam, San Gabriel watershed.

FLOOD CONTROL MEASURES

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John H. G. [Signature]

PROJECT # _____
 COUNTY _____
 CALIFORNIA FOREST & RANGE EXPERIMENT STATION
 U. S. FOREST SERVICE

3-2-72
 Flood control dam built in 1958 estimated two-thirds filled with debris by 1972 flood. Storage capacity 75,000 cu. yds., discharge area 2.75 sq. mi. Estimated to be completely washed out, probably not drained since 1900. Slacks below dam, San Gabriel watershed.
 U.S.A. 2-2-1001



3-13-38

U.S.F.S. CHG-1442

- A. Debris basin below Pickens burn of 1933, typically filled to capacity March 2. Erosion rate 125,000 cu. yds. per sq. mile. (tentative) from exceedingly rugged 0.84 sq. mile canyon. Dunsuir Basin, Los Angeles watershed.



3-13-38

U.S.F.S. CHG-1440

- B. Costly storm drains led the desilted flood runoff harmlessly from each debris basin toward the sea, proving highly effective in preventing flood damage in this region.

244-1442

WASHINGTON
The report of the
Washington State
Department of
Public Works
on the
flood damage
in the
Seattle area
is being
referred to
for
information.

3-13-38 U.S.F.S. CRO-1002
A. Debris basin below Tacoma built in 1937, typically filled to capacity March 2. Debris rate 125,000 cu. yds. per sq. mile. (tentative) from exceedingly rough 0.84 sq. mile canyon. Debris basin, Los Angeles watershed.

244-1442

WASHINGTON
The report of the
Washington State
Department of
Public Works
on the
flood damage
in the
Seattle area
is being
referred to
for
information.

3-13-38 U.S.F.S. CRO-1002
B. Gully above drains led the desisted flood runoff harmlessly from each debris basin toward the sea, proving highly effective in preventing flood damage in this region.

FLOOD CONTROL MEASURES

PLATE 8



1-1-34

U.S.F.S. 290904

- A. Destruction wrought in New Years storm of January 1934 by debris flows from Pickens burn. All storm drains were inadequate for heavy runoff experienced. Note flood-punctured house. Pickens wash culvert under Foothill Blvd., La Crescenta.



3-13-38

U.S.F.S. CHC-1439

- B. Greatly enlarged concrete storm drains, leading from canyon-mouth debris basins, protected the area in 1938. Had current storm been of longer duration, the filled basins must have discharged debris, with possible choking of drains and repetition of disaster. Repeats 290904.

60000

1-1-58
A. Destruction wrought in New York State of January 1958 by debris flows from Piedmont basin. All storm drains were inadequate for heavy runoff experienced. High flood-punished basins. Floods were caused under Tenthredin River, La. Greenhouse.

2-1-58
B. Heavily enlarged concrete storm drains, leading from canyon-mouth debris basins, protected the area in 1958. Had current storm basin of higher elevation, the filled basins were have discharged debris, with possible closing of drains and repetition of disaster.



3-2-38

Cal. Nat. Ed. (012-93M-115)

Rock-faced levees along large streams were largely effective in preventing side-cutting of straight channels, but bridges were swept away by debris-laden high water. Looking down Los Angeles River; Rio Honda enters from left.

Photo of 11th Street Bridge
4th Division Station
Grand Junction, California

Negative No. 37-1004

1-3-38
Flooded areas along large stream were largely effective in
preventing side-casting of straight channels, but bridges were
washed away by debris-laden high water. Looking down the river
River Rio Grande enters from left.

FLOOD CONTROL MEASURES

PLATE 10



3-14-38

SCS (RMG-15)

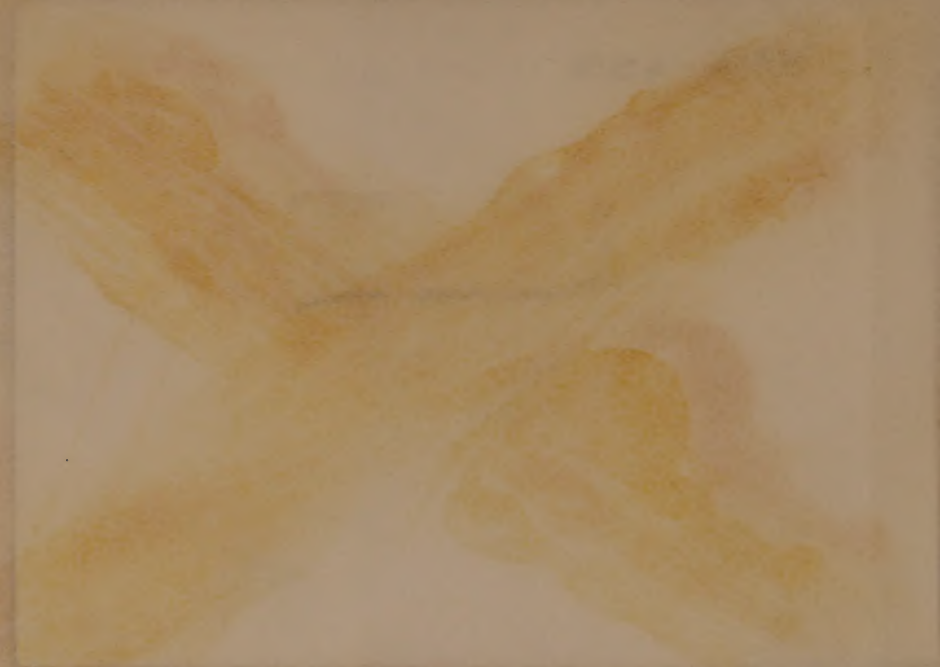
- A. The torrential force of sediment-laden flood waters breached the rock-faced levees along Los Angeles River channel above Riverside Drive bridge. Mountains of Griffith Park at right.



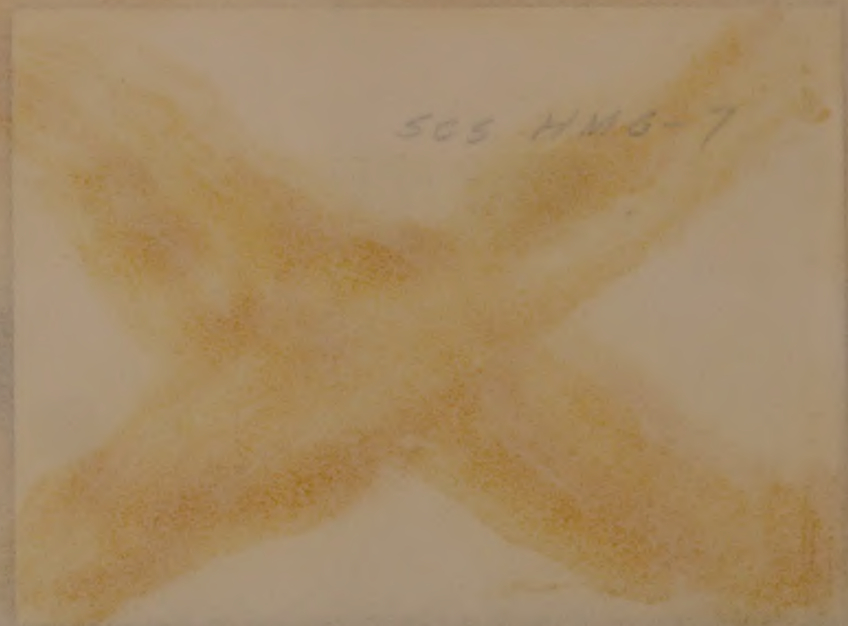
3-14-38

SCS (RMG-7)

- B. Extensive area of flood and deposition over agricultural lands along lower Santa Ana River. Note formation of delta at beach line.



3-14-38
SCS (W-12)
A. The terraced face of sediment-laden flood waters breached the rock-lined levee along the lower Mississippi River channel above Riverdale Drive bridge. Mountain of debris at right.



3-14-38
SCS (W-12)
B. Extensive area of flood and deposition over agricultural lands along lower Mississippi River. Note formation of levee at each line.

MOUNTAIN HIGHWAYS



THE UNIVERSITY OF CHICAGO

THE UNIVERSITY OF CHICAGO



3-14-38

U.S.F.S. CHG-1464

A. Washout caused by side canyon drainage, Angeles Crest Highway, Los Angeles watershed. Soil loss estimated 32,000 cu. yds.



3-14-38

U.S.F.S. CHG-1467

B. Surface erosion and side canyon drainage causing soil loss estimated 33,000 cu. yds., this fill, this storm.

CHG-1464

REPORT MADE FOR
The Bureau of Reclamation, U.S.D.A.
by
Clark H. Gleason
IN CHARGE
COUNTRY
CALIFORNIA
MOUNTAIN & RANGE EXPERIMENT STATION
U. S. FOREST SERVICE

3-14-35
A. Washout caused by slide canyon drainage, Angeles Crest Highway,
Los Angeles watershed. Soil loss estimated 35,000 cu. yds.
U.S.D.A. CHG-1464

CHG-1467

REPORT MADE FOR
The Bureau of Reclamation, U.S.D.A.
by
Clark H. Gleason
IN CHARGE
COUNTRY
CALIFORNIA
MOUNTAIN & RANGE EXPERIMENT STATION
U. S. FOREST SERVICE

3-14-35
A. Washout erosion and slide canyon drainage causing soil loss es-
timated 35,000 cu. yds., this slide.
U.S.D.A. CHG-1467



3-21-38

U.S.F.S. DMI-895

- A. Erosion rate for this high standard mountain highway is estimated at 150,000 cu. yds. per mile, this storm. Surface wadding and planting could not control typical destruction of fills by flows from side canyons. California State section of Angeles Crest Highway below Red Box, Los Angeles watershed. Man at left stands on remnant of original road surface.



3-21-38

U.S.F.S. DMI-880

- B. Side-canyon discharge and stream undercutting at toe of slope combined to destroy this Angeles Crest Highway fill. Eroded material will ultimately lodge in Devil's Gate Reservoir.

1938-1939

U.S.A. Special Flood Report
March 1938
O. M. HCH
MOUNTAIN HIGHWAYS
SOUTHERN CALIFORNIA

7-21-38
A. Section made for this high standard mountain highway is estimated at 150,000 sq. yds. per mile. This water, surface melting and blasting could not control typical destruction of hills by these two ways. California State section of Angeles Great Highway below canyon. Los Angeles watershed. Man at left stands on remnant of original road surface.

1938-1939

7-21-38
B. Side-canyon discharge and stream meandering at base of slope con- sists to destroy this Angeles Great Highway fill. Eroded material still distinctly today in Devil's Gate Pass.



3-15-38

U.S.F.S. DMI-861

- A. Lack of damage to fill slope having good vegetation cover, treated by method in U.S.D.A. Circular 380. Waterman Canyon Highway, Santa Ana Watershed, San Bernardino N. F.



3-21-38

U.S.F.S. DMI-898

- B. Brush wattles layered in connection with fill construction, plus surface treatment of rice straw and planted cereal grains, stabilized these slopes. Bureau of Public Roads section, Angeles Crest Highway above Red Box, San Gabriel watershed.

DM-861

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Photo by _____

Country _____

U.S. Forest Service & National Park Service

U.S. Forest Service

3-13-58

A. Part of damage to fill slope having good vegetation cover, located by section in U.S. Forest Service, Section Canyon Highway, Santa Ana Mountains, San Bernardino Co., Cal.

DM-878

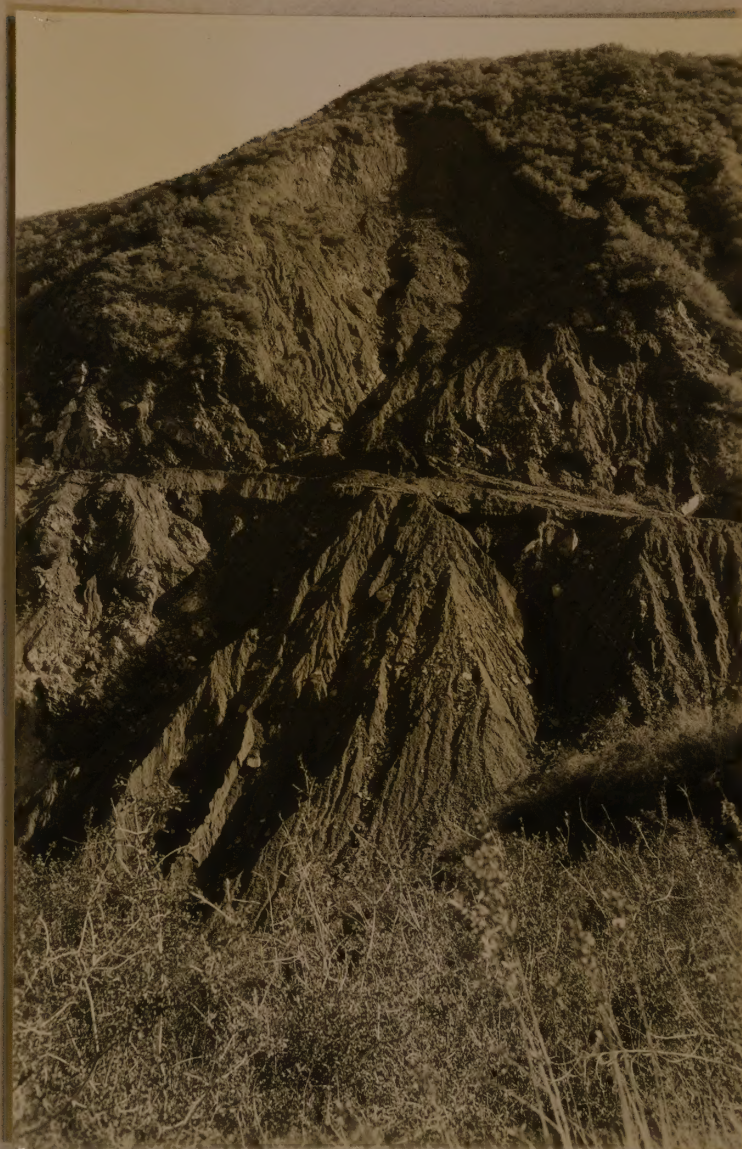
U.S. Forest Service

3-13-58

B. Part of damage located in connection with fill construction, plus surface treatment of this area and planted cover, located by section in U.S. Forest Service, Section Canyon Highway, Santa Ana Mountains, San Bernardino Co., Cal.

MOUNTAIN SECONDARY ROADS

MOUNTAIN SECONDARY ROADS



3-14-38

U.S.F.S. DMI-852

Typical condition of mountain roads in region; slides and slumps above, washouts below. Soil loss here estimated 45,000 cu. yds; will be caught by Morris Reservoir. Glendora Mt. Road, San Gabriel watershed. Estimated erosion loss for road, 4,000 cu. yds. per mi.

MOUNTAIN SECONDARY ROADS

DM1-852

EXPLANATION

The following is a description of the symbols used in this report.

D. M. ROY

CHIEF

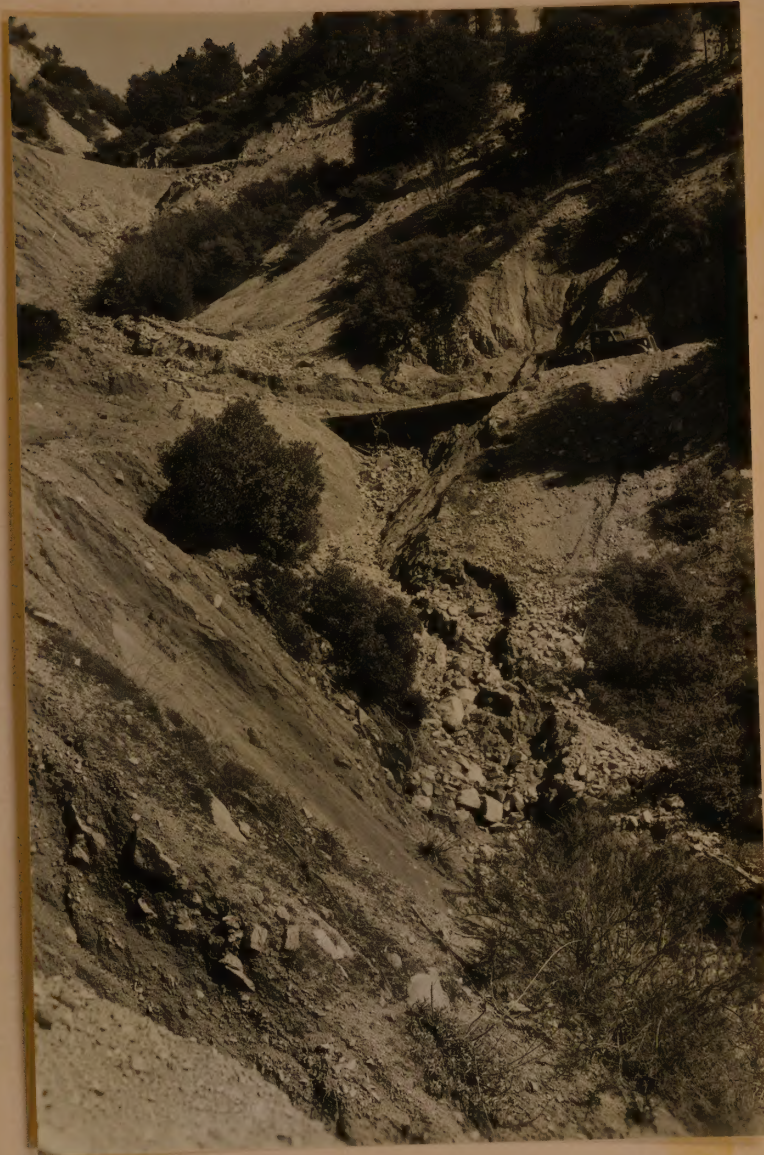
U.S. GEOLOGICAL SURVEY, WATER RESOURCES DIVISION

U.S.G.S. DM1-852

7-18-38

Typical condition of mountain roads in region; slides and erosion above, westward below. Soil loss here estimated \$5,000 per foot; will be caught by Morris Reservoir. Elsewhere \$2,000 per foot. Estimated erosion loss for road, \$4,000 per mile.

MOUNTAIN SECONDARY ROADS



3-14-38

U.S.F.S. DMI-853

Erosion estimated 1000 cu. yds., caused by concentration of road surface drainage and inadequate culvert provision for canyon flow. City Creek road, Santa Ana watershed, San Bernardino N. Y. Estimated erosion loss for road, 2,300 cu. yds. per mile.

HOUSTON COUNTY, TEXAS

DM-1-853

3-14-72
U.S.A. 101-101
Houston estimated 101-101 and 101-101, caused by contamination of
road surface drainage and inadequate drainage provisions for
road surface drainage, City Green Road, Texas and watershed, San Antonio-
San Antonio, Texas. Estimated erosion loss for road, 2,700 cu. yds. per
mile.

MOUNTAIN SECONDARY ROADS



3-18-38

U.S.F.S. WTC-4

Undermining of roadbed by stream, typical of all highways located close above canyon bottoms. The need for channel control works is apparent. Lytle Creek Road, Santa Ana watershed, San Bernardino N. P.

MOUNTAIN TRUCK TRAILS

RECEIVED

MOUNTAIN TRUCK TRAILER

MOUNTAIN TRUCK TRAILS

PLATE 17



3-14-38

U.S.F.S. DMI-854

- A. Typically eroded overcast slopes on which no control work was attempted. Average overcast slope loss estimated 75 cu. yds. per mile. Estimated total erosion loss for road, 550 cu. yds. per mile. City Creek truck trail, Santa Ana watershed, San Bernardino N. F.



3-16-38

U.S.F.S. DMI-868

- B. Roadbed washed out by side canyon drainage. Estimated soil loss, 130 cu. yds. Monroe Truck Trail, San Gabriel watershed.

DM-854

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PHOTO BY D. M. HULL

COUNTRY

CALIFORNIA FOREST & RANGE EXPERIMENT STATION
U. S. FOREST SERVICE

31

U.S.D.A. DM-854

3-14-38

A. Typically eroded overcast slopes on which no control work was attempted. Average overcast slope loss estimated 75 cu. yds. per acre. Estimated total erosion loss for road, 250 cu. yds. per mile. City Creek truck trail, 250 cu. yds. per mile. San Bernar-

DM-868

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PHOTO BY D. M. HULL

COUNTRY

CALIFORNIA FOREST & RANGE EXPERIMENT STATION
U. S. FOREST SERVICE

U.S.D.A. DM-868

3-15-38

B. Roadbed washed out by side canyon drainage. Estimated soil loss, 150 cu. yds. Mountain Creek trail, San Gabriel watershed.

DAMAGE - CANYON BOTTOMS

THE UNIVERSITY OF CHICAGO
LIBRARY
500 EAST 57TH STREET
CHICAGO, ILL. 60637
U.S. DEPT. OF AGRICULTURE
BUREAU OF PLANT INDUSTRY

DAMAGE - CANYON BOTTOMS

The following is a list of the damage done to the canyon bottoms of the Colorado River by the flood of 1904. The damage was done to the land and to the crops growing on it. The land was washed away and the crops were destroyed. The damage was done to the land and to the crops growing on it. The land was washed away and the crops were destroyed.

U.S. DEPT. OF AGRICULTURE

BUREAU OF PLANT INDUSTRY



3-18-38

U.S.F.S. WTC-29

- A. Heavy runoff cascaded from barren granite peaks, filled canyons wall to wall, and quickly picked up a debris load of rock and boulders that effectively stripped all vegetation from the channels. East Fork San Gabriel River, springing from San Antonio Peak, elev. 10,080 ft.



3-13-38

U.S.F.S. CHC-1448

- B. Complete destruction of channel improvements, together with denudation and widening of wash characterize all large streams. Thirty-six summer cabins, a CCC camp, and a Ranger Station were destroyed in this canyon alone. Mouth of Big Tujunga Canyon, Los Angeles watershed.

USFS - LUTC 29

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March 18, 1934

U.S. Forest Service, Los Angeles, California

A. Heavy runoff cascaded from barren granite peaks, filled canyons with to walls, and finally plied up a debris load of rock and debris that effectively straggled all vegetation from the channels. Near North San Gabriel River, springing from San Antonio Peak, elev. 10,000 ft.

CH 6-1448

RELEASE NOTICE
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March 18, 1934
U.S. Forest Service, Los Angeles, California

B. Complete destruction of channel improvements, together with damage to and widening of wash characteristic of large stream. Thirty-six summer cabins, a CCC camp, and a Ranger Station were destroyed in this canyon alone. South of Big Tujunga Canyon, Los Angeles watershed.



3-16-38

U.S.F.S. WTC-19

- A. Flood-torn remains of a summer cabin at Robert's Camp, Big Santa Anita Canyon, San Gabriel watershed. Forty-two such cabins were completely destroyed in this canyon alone.



3-15-38

U.S.F.S. WTC-3

- B. Recreational areas suffered widespread destruction. Picnic tables, water developments, roads, and great shade trees were swept away; a \$100,000 investment in camp ground was lost here. Note debris remaining on canyon floor. Lytle Creek, Santa Ana watershed.

DAMAGE - CANYON BOTTOMS

PLATE 20



3-9-38

U.S.F.S. CHG-1403

- A. Typical destruction of canyon-bottom highway, requiring complete relocation of new road, with attendant loosening of soil and increase of sediments in Devils Gate Reservoir. Mouth of Arroyo Seco Canyon, Los Angeles watershed, Angeles N. F.



3-9-38

U.S.F.S. CHG-1404

- B. Site of Millard Canyon bridge, showing character of debris that destroyed it. Millard watershed was largely burned in 1934 and 1935. Arroyo Seco road, Los Angeles watershed.

DAMAGE - URBAN AREAS

RAMA WASHI - KOMBAT

DAMAGE - URBAN AREAS



3-1-38

Cal. Nat. Gd. (0-7-92L-115)

Destructive spread of flood waters through suburban settlement along poorly defined, unimproved Tujunga Wash, at Van Nuys, Los Angeles watershed. The single flood control dam was inadequate.

WASHOE - URBAN AREA

Photo by 115th Photo Section
10th Division Aviation
Grand National Guard
Negative No. 38-38

3-1-38
Destructive spread of flood waters through suburban settlement along
poorly defined, unimproved drainage wash, at Van Nuys, Los Angeles
watershed. The single flood control dam was inadequate.
Cal. Nat. Bd. (0-7-38-115)

DAMAGE - URBAN AREAS



3-1-38

Calif. Nat. Gd. (0-6-92L-115)

North Hollywood suffered severely in destruction of homes, streets and highways. Lankershim bridge stood at left, at junction of Tujunga Wash (near) and Los Angeles River (beyond).

DAMON - URBAN AREA

Photo by 1st Photo Section
2nd Division Aviation
California National Guard
Negative No. 38-28

3-1-53
North Hollywood suffered severely in destruction of houses, streets
and highways. Damages to bridge at left, at junction of
Toluca River (near) and Los Angeles River (below).

DAMAGE - URBAN AREAS



3-3-38

Cal. Nat. Gd. (92L)(115-38-3-0)

Destruction of highly restricted suburban residential district and U. S. Highway 101 by Los Angeles river, North Hollywood. Whole city blocks were gutted by flood waters that poured over the single flood control dam.

MANAGE - URBAN AREAS



Photo by Photo Section
40th Division Aviation
California National Guard

Negative No. 38-3

1-7-38
Description of highly restricted urban residential district
and W. A. Highway 101 by Los Angeles River, North Hollywood.
Whole city blocks were raised by flood water that poured over
the state flood control dam.



3-10-38

U.S.F.S. CHG-1415

- A. Silt-piled streets of beautiful Rossmoyne Village, Glendale, derived partially from area burned recently in nearby mountains.



3-13-38

U.S.F.S. CHG-1454

- B. Homes of a highly restricted residential district in Altadena were severely damaged by overflow of debris basin below a burned area.

22-01-7

DAMAGE - URBAN AREAS



3-2-38

Cal. Nat. Gd. (09-931-115)

Extensive inundation of oil field and industrial developments in broad valley of Ballona Creek north of Playa Del Rey; Venice and Santa Monica in distance.

DAMAGE - URBAN AREAS

Photo by 115th Photo Section
40th Division Aviation
California National Guard

Negative No. 57-1264

3-2-78
Extensive inundation of all field and industrial developments in
great valley of Salton River north of Playa Del Rey; Venice and
Santa Monica in distance.

DAMAGE - VALLEY HIGHWAYS AND RAILROADS

100-100000-100000

DAMAGE - VALLEY HIGHWAY AND RAILROAD

100-100000-100000
100-100000-100000
100-100000-100000
100-100000-100000

100-100000-100000
100-100000-100000
100-100000-100000
100-100000-100000

DAMAGE - VALLEY HIGHWAYS AND RAILROADS



3-3-38

Cal. Nat. Gd. ()

Rock-faced levees failed to restrain the Los Angeles River from meander cutting, with consequent destruction of U. S. Highway No. 99, below Glendale. Vegetative cover on Verdugo Mountains in center distance is still sparse after demudation by fire in 1927.

DAMAGE - VALLEY HIGHWAYS AND RAILROADS

Photo by 115th Photo Section
10th Division, 1st Army
California National Guard
Negative No. 38-48

7-7-38
Water-flood levees failed to restrain the Los Angeles River from
meander cutting, with consequent destruction of U. S. Highway No.
99, below Glendale. Vegetative cover on Verdugo Mountains in
center distance is still sparse after denudation by fire in 1927.
(Cal. Nat. G.)



March 1938

U.S.F.S. 82-H-1

- A. Vineland St. railroad bridge destroyed by flood waters of Big Tujunga Wash, North Hollywood.



March 1938

U.S.F.S. 84-H-4

- B. Destruction of railroad bridge over Los Angeles River, at North Broadway and San Fernando Road, Los Angeles. Riverside Drive on hillside above.

U.S. Forest Service photo

By E. R. Huber

No. 12-10-1

U.S. Forest Service photo

March 1938

Damage to Valley Highway and Railroad by flood waters of the Los Angeles River, North Hollywood.

84 H-4

U.S. Forest Service photo

By E. R. Huber

No. 12-10-1

U.S. Forest Service photo

March 1938

Damage to Valley Highway and Railroad by flood waters of the Los Angeles River, North Hollywood. Riverbeds drive on hillside above.

DAMAGE - VALLEY HIGHWAYS AND RAILROADS



(0-8-108L-115)(3-3-38)(8.25-2000) FLOOD AREA, E. SAN BERNARDINO

3-3-38

Cal. Wat. Bd. (0-8-108L-115)

Widespread destruction of railroad and highway bridges, industrial developments and agricultural lands by flood waters of Santa Ana River and Lytle Creek, at Colton.

DAMAGE - AGRICULTURAL AREAS

DAMAGE - AGRICULTURAL AREAS



3-14-38

S.C.S. HMG-3

- A. Flood wash down old channels through highly developed foothill citrus belt near Redlands.



3-14-38

S.C.S. HMG-14

- B. Many highly developed properties were severely damaged by the sweeping rush of flood water, among which the above citrus grove near Cucamonga is an extreme but not unusual example.

DAMAGE - AGRICULTURAL AREAS

PLATE 30



3-14-38

S.C.S. HNC-12

- A. Deposition on highly developed agricultural lands and silting of channel in the Santa Ana River near Anaheim.



3-14-38

S. C. S. HNC-9

- B. Sweeping flood waters caused severe damage to vineyards and other valuable agricultural developments, such as this one lying eastward of Cucamonga.



3-14-38
A. Deposition on highly developed agricultural lands and filling of channel in the Santa Ana River near Anaheim.



3-16-38
B. Flooding flood caused severe damage to vineyards and other valuable agricultural developments, such as this one lying eastward of Orem.



3-14-38

S.C.S. HMO-4

- A. Severe sheet and gully erosion on agricultural lands, near Beaumont, California, caused by runoff originating on fields themselves.



3-14-38

S.C.S. HMO-10

- B. Fine components of the eroded materials discharged into clear ocean waters by the muddy flood flow from Santa Clara River, characteristic also of the condition at mouths of Los Angeles, San Gabriel, Santa Ana, and other rivers in southern California.

PLATE 21



1. Large sheet and fully exposed on agricultural lands, near Fresno, California, caused by runoff originating on fields themselves.

U.S.G.S. PHOTO

7-14-35



2. Fine fragments of the eroded material distributed into clear ocean waters by the muddy flood from Santa Clara River, characteristic also of the condition at mouth of Los Angeles, San Gabriel, Santa Ana, and other rivers in southern California.

U.S.G.S. PHOTO

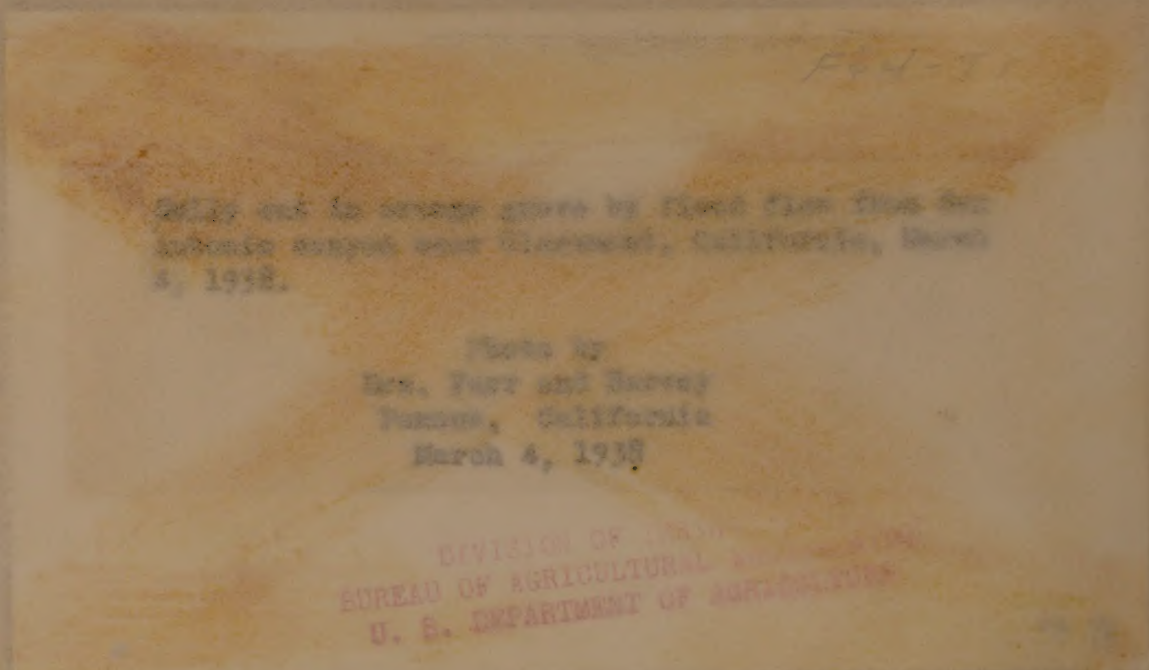
7-14-35



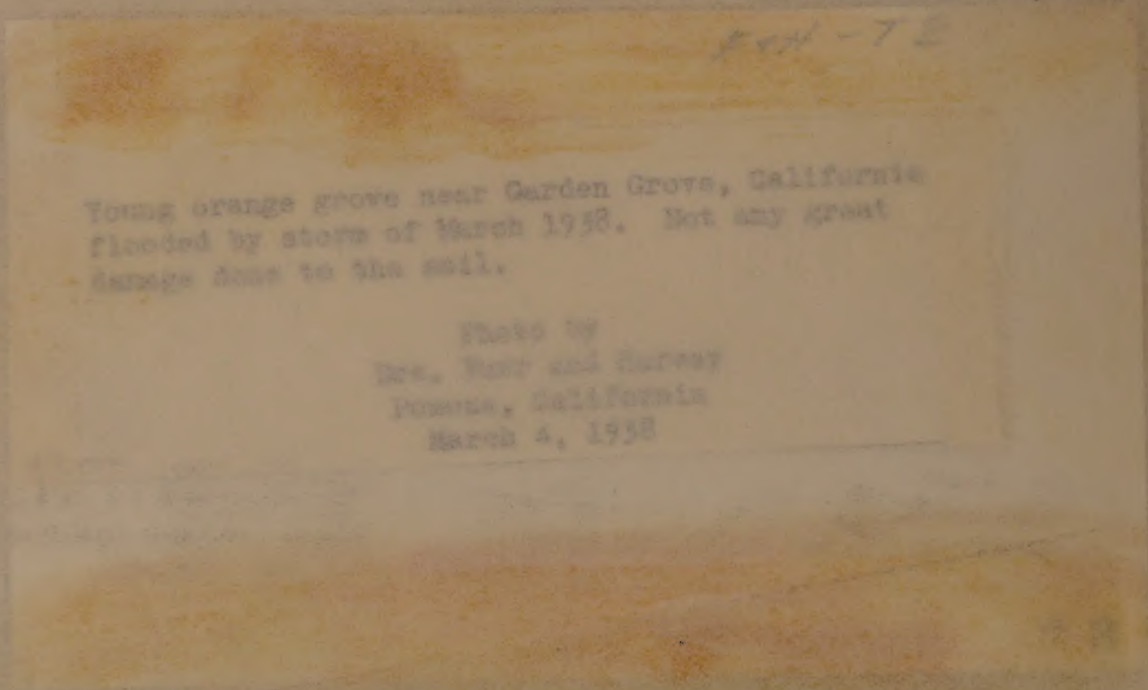
3-3-38 Bur. Ag. Eng. F&H-T1
A. Typical gullying of orange grove high on the valley alluvial fan by San Antonio Wash, near Claremont.



3-4-38 Bur. Ag. Eng. F&H-T2
B. Nearer the ocean, groves suffered through deposition of fine sediments transported by flood waters from agricultural areas and mountains of the upper watershed. Garden Grove region, Santa Ana drainage.



A. Typical eroding of orange grove high on the valley alluvial fan by San Antonio Wash, near Claremont. 3-8-38 Bur. Ag. Eng. FSM-TI



B. Young orange grove near Garden Grove, California, flooded by water from debris. 3-11-38 Bur. Ag. Eng. FSM-TS

DAMAGE - AGRICULTURAL AREAS



3-10-38

Bur. Ag. Eng. DNB-T1

Walnut orchard gullied 10 feet deep by overflow waters of lower San Antonio Creek, Santa Ana watershed. Shows serious erosion of deep soils in the highly valuable lower valley regions.

DAMAGE - AGRICULTURAL AREAS



11-2-76

U.S. DEPARTMENT OF AGRICULTURE
BUREAU OF RECLAMATION
DIVISION OF IRRIGATION

3-10-76
Rainfed orchards killed in loss deep by overflow waters of lower
San Joaquin River. Some are waterlogged. Some serious erosion
of deep soils in the highly valuable lower valley regions.

WATER CONSERVATION MEASURES

REPUBLICAN PARTY

WATER CONSERVATION MEASURES



3-15-38

Bur. Ag. Eng. DWB-T4

Earth fill, rubble-masonry surfaced check dam five feet high, that was broken through by flood-borne boulders. Such construction can not withstand the battering of torrent-carried debris. West Fork Devil Canyon, Santa Ana watershed.

WATER CONSERVATION MEASURES



3-15-38
 With this, water-conserving methods are five feet high, that
 was broken through by flood-borne debris. Such conservation
 can not withstand the battering of torrent-carried debris. Post
 with Devil Canyon, Santa Ana watershed.

WATER CONSERVATION MEASURES



3-14-38

Bar. Ag. Eng. DHB-T5

Dams of solid rubble-masonry, with concrete spillways, closely spaced along channel, successfully withstood the battering of March 2 flood. Deer Creek spreading grounds, Santa Ana watershed.

WATER CONSERVATION MEASURES



3-11-38

Bur. Ag. Eng. DWB-T2

Headgates and water spreading structures that withstood the torrent and were largely responsible for diverting flood waters from nearby cities of Claremont and Pomona. Mouth of San Antonio Canyon, Santa Ana watershed.

GENERAL OBSERVATION REMARKS

NO SIGNIFICANT
CHANGES IN NATURAL CHANNELS
OCCURRED DURING FLOODING

DWB-72

7-11-78
Flooded and water spreading situations that witnessed the current
and were largely responsible for diverting flood waters from nearby
areas of livestock and humans. Much of the historic damage, Santa
Ana watershed.

WATER CONSERVATION MEASURES



3-3-38

Bur. Ag. Eng. DHB-F3

Water retention dykes, of good design and construction, withstood the flood perfectly and gave protection to lower Santa Ana Valley areas by impounding debris and retarding runoff. View down Cucamonga Creek, from mouth of canyon.

WATER CONSERVATION MEASURES

DEPARTMENT OF AGRICULTURE
BUREAU OF AGRICULTURAL ENGINEERING
WASHINGTON, D. C.

6148-73

3-7-35
After extensive study, of food habits and composition, with food
the food habits and gave protection to lower forms and killing
area by separating debris and retaining water. How does
Gusman, Great, the much of water.



Glenn Property

Striking example of clean-cultivated land continuously farmed to beans year after year. Shows comparison between the hill in the foreground which was clean-cultivated and the hill in the background which had been retired for two years, 1935 and 1936.



Glenn Property

Outstanding example of different degrees of erosion caused by different farming practices. Light, lower portion of photograph is of fairly level ground which has been continuously farmed to beans without crop rotations or without giving the land a rest. Upper half, or shaded portion, is of the hill shown in the background of the adjacent photograph and which had been retired during 1935 and 1936. All of the land was farmed to beans in 1937, and on March 10 when this photograph was taken, the upper half of the hill had been cultivated once, the lower half twice, and the bottom or light portion, four times. This gives a striking example of the damage or protection obtained by different cultivation practices.

SOILS: Rincon loam with moderate clay sub-soil.

CHAPTER I

The first thing I noticed when I stepped out of the car was the heat. It was a sticky, oppressive heat that seemed to wrap around me like a heavy blanket. I had heard that the weather in this part of the country was terrible, but I didn't realize just how bad it would be. The sun was beating down on my face, and the air was thick with humidity. I took a deep breath, trying to get used to it, but it felt like I was breathing in fire. I looked around at the other people in the car, who were all looking out the windows with expressions of discomfort. I knew I was in for a long drive home.

CHAPTER II

The drive home was a nightmare. The car was sweltering, and the air conditioning was barely keeping the interior from becoming an oven. I was sweating all over, and my clothes were sticking to my skin. I kept looking out the windows, hoping to see a sign of relief, but the heat was everywhere. I felt like I was trapped in a prison of fire. The car was shaking and vibrating, and I could hear the engine struggling to keep the car moving. I was so hot that I started to feel dizzy and nauseous. I knew I had to get out of there as soon as possible, but I didn't know where to go. I was lost, and I was alone. I was in a terrible situation, and I didn't know how to get out of it.



CAL-4251

John Arneill Property

Located in the Camarillo District. This property was planted to flax previous to the storm of March 2. Soil is a sandy loam lying on approximately a 4% slope. No erosion control measures on this farm. Washes and gullies created by March 2nd storm on approximately 1/2 of 65-acre field. Estimated loss to growing crop, 65%. Thousands of tons of deposition were washed across the State Highway and deposited in valuable orange groves below which were controlled completely with a fine winter growing cover crop.

SOILS: Huerhuero sandy loam with dense clay subsoil.



CAL-4254

Barbara Hughes' Property

This property is adjacent to the Arneill property on the West. Identical as to size, slope and soils. Planted to winter flax the same week as the Arneill property. This property controlled by broad-base terraces. Very little damage to terraces. Minor soil losses.

SOILS: Huerhuero fine sandy loam with dense clay subsoil.



Harris Hitch Ranch

This orchard lies immediately adjacent to the Waters' property. Shows soil washes and losses where no erosion control methods have been taken. Formerly, all apricot groves in this district were farmed in this manner.

SOILS: Madera sandy loam with moderate clay sub-soil.



Mose Waters' Ranch

This 100-acre apricot grove is dry-farmed and prior to this year has been clean-cultivated during the winter months. Property under cooperative agreement at present and erosion being controlled with basin-listing and cover cropping. To date, 17 and 1/2 inches of rain have fallen on this orchard, including the rain of March 2.

SOILS: Yolo loamy sand to 6 feet or more.



CAL-4259

James Hitch Property

View of water and sand flowing across a ranch, off the Las Posas Area, during the storm of March 2nd. This picture was taken from a wagon standing in the field. Later, the wagon was nearly covered with silt and debris from the water flowing in the foreground.



CAL-4260

James Hitch Property

Same view as adjoining picture but photographed on March 10th. Shows condition of field after flood waters had subsided. Beginning April 1, this field is to be planted to Valencia oranges. Owner estimates cost of removing sand from field at \$250 an acre. Stock and equipment shown in picture are being used to clear the field and prepare it for the planting of oranges.

SOILS: Sorrento sandy loam,
uniform to 6 feet.



Hoffelt Property

Showing 33 year old English Walnut grove, 9 acres in area, being covered by deposition from clean-cultivated bean land two miles distant. Measurements were taken of the deposition and the average depth was estimated as 3 feet. This deposition varies from a few inches on one part of the orchard to as much as six feet in the deepest parts. Owner considers both orchard and land a total loss.

SOILS: Yolo sandy loam



Hoffelt Property

Showing depth of deposition around 33 year old English Walnut tree. Banks of excavation are of pure sand with no agricultural qualities whatever.

